

Original Article

Pattern of mandibular third molar impaction and its association to caries in mandibular second molar: A clinical variant

V. K. Prajapati¹, Ruchi Mitra¹, K. M. Vinayak²

¹Department of Dentistry, Rajendra Institute of Medical Sciences, Ranchi, ²Department of Oral Pathology, Vananchal Dental College, Garhwa, Jharkhand, India

ABSTRACT

Background: Caries in second molar is common and prophylactic removal of the impacted teeth may be considered appropriate. Caries detection and restoration can be difficult and a restored second molar can undergo recurrent caries if the third molar is not removed prophylactically. In this study, the clinical findings related to impaction and its association with angular position and depth of impacted third molar were evaluated.

Materials and Methods: A retrospective descriptive study was carried out among the patients visiting the outpatient, department of Dentistry, RIMS, Ranchi. The clinical examination, periapical radiographs and Pre-op OPG were taken. Teeth positions were analyzed by Pell and Gregory and Winter classification. The angulation and depth of mandibular third molar impaction and caries in the second molar with the eruption status of the mandibular third molar was determined.

Results: A total of 200 patients were included in the study between age group 17-45 years. Majority of the Patients reported to the hospital with complaints of decayed tooth (66%) and pain (59%). The most common third molar impaction was mesioangular followed by distoangular. A statistically highly significant difference ($P = 0.001$) was obtained with the presence of caries in second molar adjacent to mesioangular third molar in class I and level B.

Conclusion: According to this study, pattern of mandibular third molar impaction is in association to caries in mandibular second molar. More future studies are needed. In addition, the results of the present study can be used to screen and inform the patients about the possibility of caries in relation to third molar mandibular impaction.

Key Words: Halitosis, impaction, mandibular, molar, pain

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Address for correspondence:
Dr. Ruchi Mitra,
Senior Resident, Department
of Dentistry, Rajendra
Institute of Medical
Sciences, Ranchi, Jharkhand,
India.
E-mail: dr_ruchimitra@gmail.
com

INTRODUCTION

An impacted tooth is one that fails to erupt into dental arch within the specific time.^[1,2] The time of third molar eruption is variable among different individuals. It could start at an age of 16 or impede until 18–20.^[3] Mandibular third molars are the most frequently impacted teeth.^[4,5] The reason is probably

that they are the last teeth erupting into dental arch, therefore, the chance of space deficiency for their eruption is high.^[6] Third molar eruption and continuous positional changes after an eruption can be related to race, nature of the diet, the intensity of the use of masticatory apparatus, and genetic background.^[7]

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Caries is mentioned as one of the common pathological features associated with mandibular third molar and adjacent tooth. There is an opinion that the tooth position and inclination play a major role in caries development process.^[8,9] Partially erupted tooth does not participate in mastication and for this reason offers a conditions more favorable for bacterial accumulation than fully erupted tooth.^[10] Due to the fact that lower and upper third molars are the most common enclosed teeth, pericoronitis associated with bad oral hygiene and lesser self-cleansing area leads to food and microorganisms accumulation that cannot be cleaned through normal brushings and flossing, causing caries development. Through the past 40 years, the incidence of teeth impaction has been grown in different populations.^[11]

The present study was undertaken to determine the pattern of third molar impaction and the clinical consequences for adjacent second molar as this clinical finding has not been reported in previous literature. Moreover, being the most prestigious government institute Rajendra Institute of Medical Sciences (RIMS), Ranchi, the capital of Jharkhand is the only center with the dental unit in public sector, many of the patients have reported with similar complaints, thus the present study was undertaken to provide a baseline data.

MATERIALS AND METHODS

The study was conducted in the Department of Dentistry, RIMS, Ranchi. Before the study, the ethical clearance was obtained from the ethical review committee RIMS, Ranchi and the necessary corrections were made. A pilot study was also conducted to determine the prevalence of mandibular third molar impaction, and sample size was determined. A study pro forma was prepared including the demographic details, and informed consent was taken from the selected patients. A number of impacted third molars, pathological conditions, and chief complaint as caries, pericoronitis, and recurrent pain were recorded. Clinical examination was done using diagnostic instruments to determine the caries extent clinically.^[12] To ensure the presence of dental caries periapical radiographs and preoperative orthopantomograms (OPGs) were taken using the standard technique.^[13] The number of total teeth, number of impacted teeth, angulation type of tooth, width and depth of impactions were noted

from the OPG. Teeth positions were analyzed by classifications of Pell and Gregory^[14] and Winter.^[15] The angulation and depth of mandibular third molar impaction, relationship between the incidence of caries in the second molars and the eruption status of the mandibular third molars were determined. Reference levels consisted of the occlusal surface of the mandibular second molar and the cemento-enamel junction of the mandibular second molar.

According to Pell and Gregory classification, Class I was labeled to a tooth which was present anterior to the anterior border of the mandible. Class II was labeled when tooth was half covered by the anterior border of mandible. When the crown was fully covered by the anterior border of mandible, it was labeled as Class III. When occlusal level was considered, Class A was given to the tooth which was at the occlusal level of its adjacent tooth. Class B was given to a tooth which was at an occlusal level between cervical level and occlusal level of adjacent tooth. When the tooth was completely buried in bone or the occlusal level of impacted tooth was below the cemento-enamel junction of adjacent tooth then it was called Class C.

All the patients between the age group of 17–45 years attending the outpatient Department of Dentistry, RIMS were included in the study. Patients with caries in mandibular second molars detected clinically and radiographically were included in this study. Furthermore, patients with any systemic infections and not giving their consent were excluded from the study.

Data were precoded, and a master chart was prepared. SPSS version 19 software (Statistical Package for the Social Sciences, IBM Corporation) was used for statistical analysis and $P \leq 0.05$ was considered as statistically significant with 95% confidence interval. Chi-square test was applied to find the association between caries and third molar impaction.

RESULTS

A total of 200 patients were included in the study attending the outpatient Department of Dentistry, RIMS, Ranchi between the ages 17 and 45 years.

The patients reported to the outpatient Department of Dentistry, RIMS with certain chief complaints. The majority of patients complaint was decayed tooth 132 (66%) followed by pain 118 (59%) food

lodgment 125 (62.5%), pus discharge 92 (46%), and halitosis 42 (21%).

Mesioangular impaction was seen as the most common of all mandibular impactions with the majority of cases between the ages 26 and 30 years. Horizontal impaction was present the most in the age group 21–25 years followed by distoangular impaction. Vertical impaction was observed the least with most common in 21–25 years [Table 1].

Table 2 shows that the number of cases with caries in the second molar was more in mesioangular, followed by distoangular impaction. The clinical findings of mandibular impaction were observed with reference to dental caries in mandibular second molar of the same quadrant of impacted third molar and antagonist tooth. A statistically high significant relation was found in relation to caries in second molar and mesioangular impaction ($P = 0.001$; $r = 0.047$). A statistically significant relation was also found with horizontal third molar impaction and dental caries and absence of antagonist tooth ($P = 0.014$; $r = 0.051$). No significant relation was found between vertical and distoangular mandibular impactions.

Table 3 shows the detailed level of third molar impaction and caries detection. The majority of caries incidence with mesioangular impaction was found in Class I Level B followed by Class II Level A whereas caries in horizontal impaction was reported in Class II Level A. There was no caries observed in Class III. Only one case showed caries in horizontal impaction in Level C.

Clinical findings related to mesioangular third molar impaction are observed in Figure 1 with dental caries in the second molar in intraoral periapical radiographs X-ray.

Figure 2 shows clinically observed intraoral sinus tract in relation to mandibular second molar due to mesioangular third molar impaction.

DISCUSSION

The study showed the pattern of mandibular third molar impactions in patients attending the government hospital, RIMS, Ranchi. The majority of patients' complaint was decayed tooth followed by pain. In a study in 2008, caries and its sequelae

Table 1: Distribution of type of impaction according to age group and gender

Type of impaction	17-20 years		21-25 years		26-30 years		31-35 years		36-40 years		41-45 years		≥45 years	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Mesioangular	12	7	13	10	17	11	19	6	5	2	2	0	1	0
Distoangular	4	3	9	4	6	3	3	2	2	0	1	0	0	0
Horizontal	3	2	11	5	5	2	4	2	1	0	0	0	0	0
Vertical	3	1	6	3	4	1	2	1	2	0	0	0	0	0

Table 2: Type of impaction and clinical findings

Type	n (%)	Mean±SD	Third molar		Antagonist tooth		Caries in adjacent second molar	r	P	Inference
			Right side	Left side	Present	Absent				
Mesioangular	105 (52.5)	1.34±0.475	62	43	27	78	87	0.047	0.0014	HS
Horizontal	35 (17.5)	1.26±0.325	20	15	9	26	19	0.051	0.014	S
Distoangular	37 (18.5)	1.16±0.073	28	9	31	6	6	0.781	0.126	NS
Vertical	23 (11.5)	1.08±0.032	17	6	22	1	4	0.672	0.231	NS

HS: Statistically highly significant relation; S: Statistically significant; NS: Nonsignificant; SD: Standard deviation

Table 3: Level of third molar impaction and caries detection

Impaction	Ramal, n (%)			Depth, n (%)		
	Class I	Class II	Class III	Class A	Class B	Class C
Mesioangular	72 (82.7)	15 (17.2)	0	32 (36)	55 (63.2)	0
Horizontal	7 (0.38)	11 (6.1)	0	11 (6.1)	7 (0.38)	1 (0.5)
Distoangular	5 (8.3)	1 (1.6)	0	4 (6.6)	2 (3.3)	0
Vertical	3 (7.5)	1 (2.5)	0	2 (5)	2 (5)	0

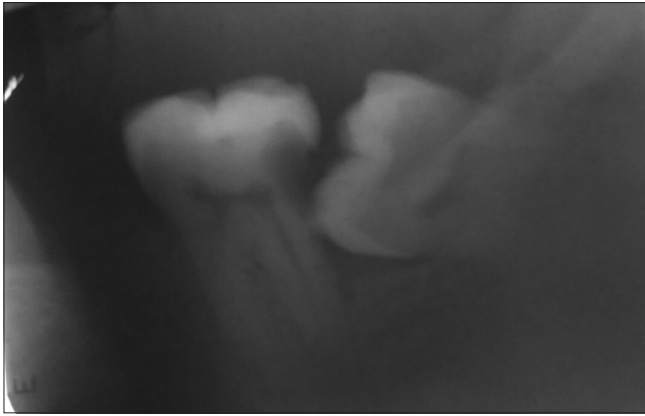


Figure 1: Intraoral periapical showing carious second molar with mesioangular third molar.



Figure 2: Clinical finding of intraoral sinus with lower second molar due to mesioangular third molar impaction.

was the major reason (63.2%) for the mandibular third molar extraction, followed by recurrent pericoronitis (26.3%) and periodontitis (9.2%).^[16] Allen *et al.* (2009) reported the incidence of 42% of the distal second molar caries associated with partially or completely impacted mandibular third molars.^[17]

In this study, mesioangular impaction was the most common mandibular impaction with majority of cases between the ages 26–30 years which is consistent with other studies.^[7,18] In our study, the majority of female patients belonged to age group 21–30 with mesioangular and horizontal impaction, which is consistent with other studies.^[19] This age group is usually a childbearing age and hence if the female patients are screened early of mandibular impaction and early extraction of the third molar prophylactically, it could help in maintaining a good oral health during pregnancy.

In this study, the most significant finding was caries in second molar adjacent to the mesioangular and

horizontal impacted third molar. The majority of the caries were reported in Class I Level B of mesioangular third molar impaction followed by Class II Level A. Horizontal impaction caries was more in Class II Level A. Level C showed the least. Mesioangular position having a converging angle of $>30^\circ$ (i.e., angulation between 40° and 80°) with the second molar was the most common type and comprised about 43% of all third molar impactions.^[20] The finding is similar to our study results.

However, the clinical finding of the presence of caries in the second molar with third molar impaction has not been discussed in the available studies so far. Two reasons could be thought. Lack of enough space for cleansing and improper oral hygiene practice. Teeth which are malaligned, malposed, rotated or otherwise not normally situated may be difficult to cleanse and tends to favor the accumulation of bacterial plaque and debris. This, in susceptible persons, would be sufficient to cause caries in a tooth, which under normal circumstances of proper alignment, would conceivably not develop.^[21] In some cases, caries is not detectable in clinical examination, but may be present in the form of hidden caries which can be visualized radiographically.^[22] This finding is also supported by another study, which reported that the risk for developing pathology along with partially impacted third molars seems to be 22%–34% higher than molars completely embedded in bone. According to a study, teeth in a mesioangular, horizontal, or inverted position present a fourfold to tenfold greater risk of noninfectious problems.^[8]

Another factor that is associated with the risk of developing distal caries is the point of contact that the third molar makes with the second molar. Partially erupted mesioangular impacted mandibular third molars that contact the cemento-enamel junction of the second molar place this tooth at risk of developing caries in the distal cervical region.^[17] Contact point localization above the cemento-enamel junction, on the other hand, poses less risk than the other positions. In case of partially exposed mesioangular and horizontal mandibular third molars, occlusal surface form plaque accumulative crevices (narrow V-shaped trough) against the distal surfaces of the second molars leading to the development of distal caries in second molars. As the gingival margin recedes, cement-enamel junction becomes exposed, forming a bacterial retention site leading to the formation of root surface caries.^[23] According to Hazen^[24] root caries

initiates on mineralized cementum and dentin surfaces which have greater organic component than enamel tissue. It is also reported that continued destruction of dentin inevitably occurs despite attempts at walling off one part of tooth. The rate at which the carious destruction progresses tends to be slower in older adults than in young people because of the generalized dentinal sclerosis that occurs as a part of the aging process. This reason could be suggestive of caries occurrence more in younger age group than in older age group which is consistent with our present study.

The results of the present study revealed that caries in the second molar could be prevented by prophylactic mandibular third molar removal that has an angulation of 40°–80° with a contact point on cements enamel to improve the prognosis of mandibular second molars and thus benefit the masticatory function and improve the quality of life.

The results of this study can be used as baseline data for future studies involving impacted third molars. Many a times, patient does not come with a complaint of impaction, in these cases patient can be informed regarding the possibility of caries in mandibular second molar due to impacted mandibular third molar. There is a lack of consideration towards hygiene procedures, so the patient motivation and oral hygiene instructions need to be given to the patient to maintain a self-cleansing area and periodic recall, and a follow-up visit to the dentist for caries detection is essential. Moreover in case of expecting mothers if extraction of mandibular impaction is done prophylactically then the pregnancy could be more agony free as extraction is not advisable during pregnancy. Caries detection and restoration can be difficult and if it progresses, root canal treatment or extraction of the second molar may be necessary. In cases of restored second molar, there are chances of recurrent caries in the second molar if the third molar is left untreated and thereby leading to extraction of both. Hence, prophylactic measures could improve the overall quality of life of the patients.

CONCLUSION

According to this study, pattern of mandibular third molar impaction is in association to caries in mandibular second molar. More future studies are needed. In addition, the results of the present study can be used to screen and inform the patients about

the possibility of caries in relation to third molar mandibular impaction.

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Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial in this article.

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